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CONCURRENCE
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REPORT

of

The Infantry Board

No. 1873

GRENADE, HAND, MARK II, LOADED WITH RDX COMPOSITION A.

FORT BENNING, GEORGIA

15 SEP 1945

2

11471 FT. BENNING, GA. 14 SEP. 45 250

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RT 823

471.6 (9 Oct 45)
GNRQT-11/43251

9 October 1945

SUBJECT: Grenade, Hand, Mark II, Loaded with RDX Composition A

TO: Commanding General
Army Service Forces
ATTENTION: Research and Development Division, Room 4E 633,
The Pentagon

1. Herewith report of test of Grenade, Hand, Mark II, loaded with RDX Composition a, conducted by Army Ground Forces Board #3 (formerly The Infantry Board).

2. Attention is invited to letter from Commanding General, Army Ground Forces to Commanding General, Army Service Forces, Subject: Service Test Hand Grenade RDX Fragmentation MK II, w/Fuze M204, file 471.6 (R) (7 Sep 45) GNRQT-11/40233, dated 7 September 1945, which forwarded the Report of Test of the subject grenade, conducted by the Cavalry Board, and wherein statement was made to the effect that the recommendations of this Headquarters were being withheld pending completion of tests by Army Ground Forces Board #3, at Fort Benning, Georgia.

3. As can be noted in the report of both testing agencies, there is little, if any, appreciable difference between the effectiveness, safety, and functioning of Mark II Hand Grenades, loaded with 1.35 ounces of RDX Composition A, and those having the present standard filler of 1.90 ounces of flake T.N.T. However, the Cavalry Board recommends adoption of the RDX filling, while the Infantry Board recommends that it not be considered.

4. In view of these factors stated above, it is recommended that RDX Composition A or T.N.T. Flake, be considered satisfactory and acceptable fillings for Grenades, Hand, Mark II.

FOR THE COMMANDING GENERAL:

W. A. TRACY
Capt., A. G. D.
Asst. Ground Adj. Gen.

1 Incl
IB Rpt (AGF Bd #3)
#1873, dtd 25 Sep 45
(in dup)

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IB-471.6

Office of
THE INFANTRY BOARD

Fort Benning, Georgia

15 SEP 1945

SUBJECT: Grenade, Hand, Mark II, Loaded with RDX Composition A.

THROUGH: The Commandant, The Infantry School, Fort Benning, Georgia.

TO: The Commanding General, Army Ground Forces,
Army War College, Washington 25, D. C.

1. Authority for test of the effectiveness of a new explosive charge in lieu of the standard loading in the Fragmentation Hand Grenade, Mark II, was given in letter, Headquarters Army Ground Forces, 31 July 1945, 471.6 (31 July 1945) GNRQT-11/35959, subject: "Grenade, Hand, Mark II". (Appendix "B")

2. Description of Material. The grenade tested has the body and fuze assembly of the present standard grenade, Fragmentation, Hand, Mark II. The only difference is in the bursting charge, which consists of 1.35 ounces of RDX Composition A, in lieu of the present standard loading of 1.90 ounces of flake TNT. (Figures 1 and 2)

3. Purpose of the test was to determine the relative merits of RDX Composition A, and the standard charge for the subject grenade, with particular reference to:

a. Amount of explosive force.

b. Fragmentation effect.

c. Range of burst.

d. Safety against small arms ammunition.

e. Physical characteristics, such as weight and stability. (Appendixes A and B)

4. Factual Background.

a. The body of the fragmentation hand grenade, Mark II, has been unchanged since the First World War, as has the general character of the fuze assembly. Shortly after that war, the bursting charge was changed from a high explosive to 0.74 ounces of EC Smokeless Powder, on the theory that the former high explosive charge was too powerful so as to cause disintegration rather than effective fragmentation of the body, and was believed

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unnecessarily dangerous to the users. The fuze was changed to match the new charge. However, after the commencement of hostilities in the present war, our troops in the Southwest Pacific were highly impressed with the British No. 36 Fragmentation Hand Grenade, which had a high explosive filling, and re-acted very unfavorably to our own Mark II Grenade, partly because of its low effectiveness and partly because the fuze emitted sparks by night and smoke by day, revealing the position of the thrower and warning the enemy. Tests by the Infantry Board, reported in Report of The Infantry Board No. 1547, dated 18 December 1943, confirmed both complaints against the Mark II Grenade, and established the superiority of the high explosive bursting charge. The present standard filling for that grenade was thereupon adopted, consisting of 1.90 ounces of flake TNT. A new fuze was also adopted, successfully eliminating objectionable noise, sparking and smoke prior to the detonation of the grenade. The exact reason for the proposed change from TNT to RDX Composition A is not clear, but it is assumed to be an attempt to improve still further the effectiveness of the grenade.

b. In the course of subsequent tests reported in report of The Infantry Board No. 1678, 20 September 1944, it was found that the TNT loaded hand grenades were not unduly subject to sympathetic detonation if packed with fuze assembly in the grenade. It was also found that the TNT loaded grenade was moderately subject to detonation by a direct hit with small arms ammunition whether fuzed or unfuzed while the same grenade loaded with Composition A appeared to be insensitive unless fuzed. (Report of The Infantry Board No. 1621, 26 May 1944).

5. Essential Facts disclosed by the instant tests, which are described in detail in the appendid Record of Test, are:

a. The subject grenades loaded with RDX Composition A are substantially identical in physical characteristics and appearance with the standard grenade. (Test 1)

b. Subject hand grenades loaded with RDX Composition A are substantially equal in discernible effects of the explosive force to those loaded with the standard TNT filler. (Test 2)

c. The size of the fragments from subject grenades loaded with the RDX Composition filler, and the penetrative force of such fragments, are slightly less than those resulting from the standard TNT filler. (Test 2)

d. The number of hits from fragmentation of grenades loaded with the subject RDX Composition A filler is greater than that from the standard TNT filler up to a radius of 20 yards, but the number of effective hits, as indicated by perforations of 3/4" ping, is less by from fifty to twenty-seven percent, at radii of 5, 10 and 15 yards. At twenty yards the number of effective

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hits, by the same standard, is slightly greater for the RDX Composition A filler. (Test 3)

e. There is only a slight difference in the danger to a thrower from the detonation of Mark II Grenades loaded with RDX Composition A and standard TNT, respectively, assuming that the grenade is thrown twenty yards, or more, the calculated chances of an effective hit at such distance upon a man in the average prone position being 25 in 10,000 for TNT and 37 in 10,000 for RDX Composition "A". (Test 3)

f. The directional distribution of fragmentation from the subject hand grenade loaded with RDX Composition A is less uniform than that produced by the standard TNT filler. (Test 4)

g. There is no appreciable difference in susceptibility to detonation by impact of small arms fire or sympathetic detonation between fuzed grenades loaded with RDX Composition A and those loaded with the standard TNT filler. (Test 5)

6. Discussion. There appears, from the tests, to be very little difference in effectiveness between Mark II Hand Grenades loaded with the 1.35 ounces of RDX Composition A and those having the present standard filler of 1.90 ounces of flake TNT. Such difference as exists appears to be in favor of the present standard. Analysis of the tests indicate that the RDX filler produces a slightly more violent detonation, which, in turn, breaks the body into a greater number of smaller fragments. The smaller mass of the fragments results in less carrying power and less penetrating effect. The only exception is that of the very small number of fragments carrying to a radius of 20 yards, where the mass of the fragments appears to be sufficient to give effect to the greater initial velocity imparted by the RDX Composition. No difference in sensitivity to sympathetic detonation while packed, or to small arms fire impinging on the fuzed grenade is discernible from the tests. The slightly greater hazard to the thrower from the RDX Composition A is of little or no importance in view of the extremely low probability of hits upon a thrower acting with standard caution at ranges of twenty yards or more. In practical effect there is very little choice between the two types of filler.

7. Conclusions. The Infantry Board Concludes:

a. That a filler consisting of 1.35 ounces of RDX Composition A for the grenade, Hand, Fragmentation, Mark II, is slightly less effective than the standard filler of 1.90 ounces of flake TNT.

b. That no appreciable advantage would result from adoption of RDX Composition A as a filler for the fragmentation hand grenade in lieu

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of the present, standard TNT filler.

8. Recommendations. The Infantry Board Recommends:

That no further consideration be given to RDX Composition A as a filler for the grenade, Fragmentation, Hand, Mark II.

INGOMAR M. OSETH
Colonel, Infantry
President